How Generating PICO and Clinical Questions from PubMed Abstracts Challenges Instruction of PubMed Search Strategies to First-Year Dental Students

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Background

- Evidence-Based Dentistry (EBD) and critical thinking are mandated by dental accreditation
- EBD skills support competency-based dental education "independent, unsupervised dental practice"
- PubMed is the primary source for dental literature

One-credit EBD course

- First-year students not expected to generate clinical questions
- Dental journal literature approximately 2% of PubMed
- Traditional PICO approach (Problem/Population, Intervention, Comparison, Outcome)
- Personal challenge to develop exemplar clinical questions to demonstrate ask, acquire EBD steps
- Online in MS Teams

Process comparison

Librarian	Course Director
Clinical scenario	PubMed abstract source
Generate Clinical Question from scenario	Note study design + possible research concerns
Convert Clinical Question to PICO elements	Identify PICO elements
Rank importance of PICO concepts	Generate Clinical Question from PICO
Convert PICO concepts to database search terms	Search database with search terms and appropriate study design filter

Course director positives

1. Using abstract-driven PICO is a free, low-impact method for students or dentists new to EBD process to gain confidence and experience.
2. Associate PICO with appraising research articles.
3. Good approach for the librarian to generate PICO examples.
4. I could repurpose the course director's PICOs in demonstrating PubMed search.

PMID: 23926585

PURPOSE: The aim of the present study was to investigate plaque levels following sonic-powered and manual toothbrushing in subjects with dental implants.

MATERIALS AND METHODS: This study included 36 male and 47 female partially edentulous patients (age range 45-78 years, mean age 59.8 years) that were randomly assigned to one of two treatment groups: the sonic toothbrush group (n = 42; Philips Sonicare FlexCare® toothbrush) or the manual toothbrush group (n = 41; Oral-B P40®). Clinical, microbiological and immunological examinations were performed blinded at baseline and after 3, 6, 9 and 12 months. Microbiological analyses were performed by real-time polymerase chain reaction. Immunological analyses (prostaglandin E2) were performed by chromatography-electrospray spectrometry.

RESULTS: The plaque index difference between baseline and 12 months at implants showed no significant difference between sonic or manual toothbrushing in a two-sided Mann-Whitney test (W = 773.5, P = 0.426, 95% CI -0.64 to 0.20). At the end of the study, there were no significant changes in plaque index, bleeding on probing, gingival index, pocket probing depth, gingival recession, clinical attachment level or the microbiological and immunological outcomes at implants or teeth in either group.

CONCLUSIONS: This study uncovered no significant difference between sonic and manual toothbrushing for plaque reduction at implants and teeth. Both toothbrushes maintain healthy peri-implant soft tissue.

P= partially edentulous patients with dental implants

I = sonic toothbrushes

C= manual toothbrushes

O= reduced plaque levels

CQ: “In partially edentulous patients with dental implants, is electric toothbrushing more effective at reducing plaque than manual toothbrushing?”

Ranking PICO concepts

- Ranking PICO elements by importance eliminates duplicate searching of concepts
- Students tended to rank P disease condition first, then the I and C concepts

1. Dental plaque
2. Sonic toothbrushing
2. Manual toothbrushing
3. Partially edentulous adults

Course director - improvements

Some examples were chosen for study design purposes but were not applicable for teaching search because they were not explicit enough for evidence-based practice:

“Does fabrication of ceramic restoration using a particular system result in a restoration with better marginal adaptation?

PICO / search habits

- Some PICO concepts are hard to match to Medical Subject Headings (MeSH)
- Students are inexperienced in:
  - verifying the quality of subject heading mapping of search terms;
  - understanding Boolean and nesting logic;
  - learning what not to search.
- Ranking prioritizes the search

Modified process

Librarian	Modified process
Clinical scenario	PubMed abstract source selected by librarian
Generate Clinical Question from scenario	Identify PICO elements in abstract
Convert Clinical Question to PICO elements	Generate Clinical Question from PICO
Rank importance of PICO concepts	Rank importance of PICO concepts
Convert PICO concepts to database search terms	Convert PICO concepts to database search terms

Next steps

- Choose some abstracts that differ from course director's choices that are easier to PICO, map to MeSH, and analyze in Search Details
- Retain a challenging abstract from course director to demonstrate a real-world example
- Retain an abstract to demonstrate in newer Clinical Queries interface

Thank you!